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BIOREMEDIATION POTENTIAL OF SUGARKELP, SACCHARINA LATISSIMA, CULTIVATED IN A COMMERCIAL OFF-SHORE INTEGRATED MULTI-TROPHIC AQUACULTURE

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ABSTRACT

Introduction
Several seaweed species have been successfully tested as biofilter in integrated multi-trophic aquaculture (IMTA). In this study, sugarkelp (*Saccharina latissima*) biofiltration potential in a commercial off-shore IMTA system was accessed year-round based on the yield, nitrogen (N) content and N removal of the produced biomass.

Methods
Sugarkelp was cultivated both in close proximity to a blue mussel and fishfarm and in a reference site, both outside Horsens fjord in Denmark. Sugarkelp production was measured by harvesting sporophytes (deployed in February 2013) from 1m rope droppers (n=3) at 2 m depth in 2013-2014. Biomass was weighed, followed by freeze drying, homogenizing and N content was found by Kjeldahl method.

Results
The highest biomass yield was achieved in August and September, whereas significantly higher yield was obtained for the seaweed cultivated at the IMTA site (respectively 1.49±0.3 and 0.92±0.3 kg fresh weight m^{-1} of cultivation line; $p<0.05$). The overall highest N removal was in September at both sites, and in addition the N removal at the IMTA was significantly higher than the reference site at this time of year (respectively 6.9 and. 5.0 g N m^{-1} of cultivation line; $p<0.05$).

Conclusion
Sugarkelp biofilter proved to be effective on removing nitrogen at both cultivation sites, with environmental and potentially economic benefits (e.g. waste water management and for application of biomass). Sugarkelp biofiltration performance was enhanced by the proximity of the mussel and fishfarm. The harvest time should be settled around September in order to achieve maximum biofiltration efficiency.